FENCE MATERIAL
FIELD SECTION 1043

1043.1 Scope. To establish inspection and sampling procedures for fencing materials except wood posts, which shall be inspected in accordance with Field Sec 1050 of this Manual.

1043.2 Apparatus.

(a) Magnetic gauge, reading range of 0-40 mils [0-1000 µm].
(b) Micrometer capable of measuring to 0.0001 in. [0.00254 mm] and accurate to within at least 0.001in. [0.254 mm].
(c) Rule with suitable graduations to accurately measure the material to be inspected.

1043.3 Procedure.

1043.3.1 Chain Link Fabric, Woven Wire Fabric, Brace Wire, Tension Wire, Barbed Wire, and Fabric Fasteners.

1043.3.1.1 Samples of these and any other wire products are to be submitted to the Laboratory at the frequency and of the size shown in Table 1 of this Section. Each roll of chain link fabric, woven wire fabric, tension wire, brace wire, or barbed wire from which a sample is cut shall be marked or tagged for later identification in the event the sample tested fails to meet all requirements. In the event the original sample fails to comply with specification requirements, that lot of material is to be resampled at double the original sampling rate. If any of the resamples fail, the lot shall be rejected. When the original sample of chain link fabric, woven wire fabric, tension wire, or barbed wire fails, the roll from which the original sample was taken shall be rejected whether the retest passes or fails. In addition to samples, a manufacturer's certification is required for aluminum alloy chain link fabric and for vinyl coated steel fabric. The certification shall be retained in the district office. A lot of these materials shall be that quantity of material of the same kind of metal, coating, style, size, and manufacturer, offered for inspection at one time.

1043.3.1.2 Field inspection of chain link fabric, woven wire fabric, brace wires, tension wire, barbed wire, and fabric fasteners is to consist of checking identification markings, dimensions and fabrication, and the certification on aluminum alloy chain link fabric and on vinyl coated steel fabric.

1043.3.1.2.1 Identification markings for the various items are to be as follows:

(a) Each roll of chain link fabric is to carry a tag showing the kind of metal and coating, the name or mark of the manufacturer, and other information sufficient to identify the lot or shipment.

(b) Each roll of woven wire fencing is to carry a tag showing the style of fence, length of fencing in the roll, class or type of coating, AASHTO M279 for zinc coated steel, and the name or mark of the manufacturer.

(c) Each spool of zinc coated steel or aluminum coated steel barbed wire is to be marked or carry a tag showing the style of barbed wire, class or type of coating, length, AASHTO M280 for zinc coated steel, and the name or mark of the manufacturer. There are no specified markings for aluminum alloy barbed wire, however, it should be properly identified as to type of metal, name or mark of manufacturer, and length.

(d) Containers or bundles of fabric fasteners and rolls of tension wire or brace wire are to be identified as to manufacturer or supplier, kind of metal, and other information sufficient to identify the lot or shipment.

1043.3.1.2.2 All dimensions should be measured for compliance with the specifications or Standard Drawings. This would include height of fabric, mesh size, wire spacing, spacing of barbs, etc. Fabrication should be checked for workmanship and to determine that the material is that specified for use.

1043.3.1.2.3 The contractor or supplier is to furnish a manufacturer's certification when supplying aluminum alloy chain link fabric. The certification is to include typical test results of physical properties representative of the material furnished and certify the material conforms to the requirements of the Specification Sec 1043 and its supplements.

1043.3.1.2.4 The contractor or supplier is to furnish a manufacturer's certification when supplying vinyl coated steel fabric. The certification is to certify that the material conforms to the requirements of the Specification Sec 1043 and its supplements.

1043.3.2 Metal Posts, Brace Rails, and Gate Frames.

1043.3.2.1 Samples of zinc coated steel and aluminum coated steel members only need to be submitted to the Laboratory when field inspection indicates questionable compliance or when requested by the Division Engineer, Materials. Samples of aluminum alloy members only need to be taken when field inspection indicates questionable compliance, when a manufacturer's certification is not furnished with the material, or when requested. When samples are taken, they shall be taken at the frequency and of the size shown in Table 1 of this Section. In the event a sample fails to comply with specification requirements, that lot of material is to be resampled at double the original sampling rate. If any of the resamples fail, that lot shall be rejected. A lot of these materials shall be that quantity of material of the same kind of metal, coating, size, and manufacturer, offered for inspection at one time.

1043.3.2.2 Zinc plus organic coated steel members shall be prequalified prior to use. A listing of those brands and manufacturers which have been prequalified is shown in Table 2 of this Section. If a manufacturer proposes to furnish a zinc plus organic coated steel member not shown on the list, the Division Engineer, Materials, is to be consulted for instructions.

1043.3.2.2.1 Samples of zinc plus organic coated steel members shall be submitted to the laboratory for determination of weight [mass] and thickness of coating. The samples shall be taken at the frequency and of the size shown in Table 1 of this Section. In the event a sample fails to comply with specification requirements, that lot of materials is to be resampled at double the original sampling rate. If any of the resamples fail, that lot shall be rejected. A lot of these materials shall be that quantity of material of the same coating, size, and manufacturer offered for inspection at one time.

1043.3.2.3 Field inspection of zinc and aluminum coated metal or aluminum alloy posts, brace rails, and gate frames is to consist of checking identification markings; dimensions and fabrication; weight [mass] per linear foot [meter] (if applicable); weight [mass] of coating (if applicable); and examination of certification pertaining to aluminum alloy members (if a certification is supplied). Field inspection of zinc plus organic coated steel members is to consist of checking identification marking, dimensions, fabrication, and weight [mass] per linear foot [meter].

1043.3.2.3.1 Containers or bundles of posts, brace rails, or gate frames are to be identified as to manufacturer or supplier, kind of metal, and other information necessary for proper identification of the lot or shipment.

1043.3.2.3.2 The outside diameter and wall thickness of standard weight [mass] steel pipe posts, rails, and gate frames are to be tested for conformance to ASTM F1083. Lightweight steel pipe rail are to be tested for outside diameter to determine conformance to Standard Drawing 607.10. Tolerances for thickness and size of the square formed posts and rails are also shown on Standard Drawing 607.10. Steel H section posts do not have specified dimension tolerances and are acceptable as long as they were manufactured to the standard size shown on Standard Drawing 607.10. Zinc plus organic coated members are to be tested for wall thickness to determine conformance to Standard Drawing 607.10. The nominal size of aluminum alloy pipe is shown on Standard Drawing 607.10; diameter and wall thickness are to be checked for conformance to ANSI H35.2. The inspector should determine what schedule number of aluminum alloy pipe is being furnished, then consult the tolerance tables, ANSI H35.2, to determine requirements. Fabrication of all items should show good workmanship and that the material is suitable for the intended use.

1043.3.2.3.3 Weight [mass] per linear foot [meter] is to be tested on all steel pipe posts, rails, materials for gate frames, and H section posts. Weight [mass] per linear foot [meter] may or may not be required on aluminum alloy pipe, depending on the schedule number of pipe furnished. It will be necessary to consult ANSI H35.2 when inspecting aluminum alloy pipe. When determining weight [mass] per linear foot [meter], as many lengths of the item should be weighed at one time as can be accurately weighed on the scales being used. The following allowable weight [mass] tolerances are to be used:

(a) Standard weight [mass] steel pipe has a weight [mass] tolerance of ± five percent (ASTM A1083).

(b) Lightweight steel pipe has a weight [mass] tolerance of minus five percent (Standard Drawing 607.10).

(c) Square formed section steel rail and posts have a weight [mass] tolerance of minus five percent (Standard Drawing 607.10).

(d) Zinc plus organic coated steel member weights [masses] shown on Standard Drawing 607.10 are minimum values.

1043.3.2.3.4 Field determination of weight [mass] of coating, by magnetic gauge, is to be made on each lot of material furnished. The magnetic gauge is to be operated and calibrated in accordance with ASTM E376. Specimens for field testing are to be selected from each lot at the frequency shown in Table 1, but in no case, shall less than three specimens be tested. A single-spot test is to be comprised of five readings of the magnetic gauge taken in a small area and those five readings averaged to obtain a single test result. At least three such areas should be tested on each of the specimens being tested, one area near each end and one near the center. This would yield at least three test results for that specimen. Average the three test results to obtain the average coating weight [mass] for that specimen. Average all test results from all specimens to obtain the average coating weight [mass] to be reported. Also report the minimum coating weight [mass] which would be the lowest average coating weight [mass] found on any one specimen. Material may be accepted or rejected for galvanized coating on the basis of magnetic gauge results. If a test result fails to comply with the specifications, that lot should be resampled at double the original rate. If any of the resamples fail to comply with the specifications, that lot is to be rejected. The contractor or supplier is to be given the option of sampling for Laboratory testing, if magnetic gauge test results are within minus 15 percent of the specified coating weight [mass].

1043.3.2.3.5 Certifications for aluminum alloy posts, rails, gate frames, or expansion sleeves are not required by the specifications. However, a certification is desirable in order that full sampling and testing will not be necessary. A manufacturer's certification should show typical physical properties representative of the material and certify that it conforms to the requirements of the Specification Sec 1043 and its supplements.

1043.3.3 Miscellaneous Fittings and Hardware.

1043.3.3.1 Samples of zinc coated steel fittings and hardware only need to be submitted to the Laboratory when field inspection indicates questionable compliance, when the item is of a size or shape that cannot be tested for coating weight [mass] with a magnetic gauge, or when requested by the Division Engineer, Materials. A certification and field inspection are required for the acceptance of aluminum alloy fittings and hardware. Samples are not required to be submitted to the Laboratory but may be submitted anytime the inspector needs verification of inspection results. When samples are taken, they are to be taken at the frequency and of the size shown in Table 1 of this Section. In the event a sample fails to comply with specification requirements, that lot of material is to be resampled at double the original sampling rate. If any of the resamples fail, that lot shall be rejected. A lot of these materials shall be that quantity of material of the same kind of metal, coating, type, size, and manufacturer, offered for inspection at one time.

1043.3.3.2 Field inspection of miscellaneous fittings and hardware is to consist of checking identification markings, fabrication, weight [mass] of coating on zinc coated steel items, and examination of the certification required for aluminum alloy items.

1043.3.3.2.1 Containers or bundles of fittings and hardware should be identified as to type of item, kind of metal, manufacturer, and other information necessary to properly identify the lot or shipment. Due to the variable source of manufacture and other factors, which tend to make industry consider these items inconsequential, the required identity may be lost. This may be tolerated on zinc coated steel items so long as the contractor or supplier sets aside and maintains identification of the lots of material being offered for inspection. The loss of original identification of aluminum alloy fittings and hardware is to result in rejection since the material must be covered by a certification pertaining to that material.

1043.3.3.2.2 Miscellaneous fittings and hardware are to be inspected for fabrication showing good workmanship and that the item is of the size and shape for the intended use.

1043.3.3.2.3 Weight [mass] of coating is to be determined by magnetic gauge on each lot of fittings and hardware. Test procedures and conditions of acceptance or rejection shall be as explained in paragraph 1043.3.2.3.4 of this Section except the number of single spot tests may vary due to the size of item.

1043.3.3.2.4 Aluminum alloy fittings and hardware require a certification to be furnished, in triplicate, by the contractor or supplier. The certification is to show typical test results of physical properties and certify that the material furnished conforms to the Specification Sec 1043 and its supplements.

1043.3.4 Gates. Inspection of the components of gates have been covered above; however, it is important to point out that if gates are assembled at the time they are offered for inspection, no samples need be taken. Field inspection of the fabrication and dimensions; and weight [mass] of coating, if coated, will be sufficient. It is expected that gates being fabricated within the State or at points outside the state where inspection is normally performed will have the components inspected prior to fabrication.

1043.4 Report. SiteManager is to be used for submitting samples to the Laboratory and as an acceptance report. If aluminum coated steel, vinyl coated steel, aluminum alloy materials, or zinc plus organic coated steel materials are inspected or sampled, the report must be altered as required to reflect the proper material and tests desired or performed. Reports for zinc plus organic coated steel members shall also include the brand name. The report is to indicate acceptance, qualified acceptance, or rejection. Appropriate remarks, as described in General Sec 7.1.2 of this Manual, are to be included in the report to clarify conditions of acceptance or rejection. If a sample is submitted to the Laboratory for testing use SiteManager. The Laboratory will perform the designated tests and complete the report distribution of reports for materials purchased under a Department purchase order is to be as described in Field Sec 2001 of this Manual.